

this continuing educational process must somehow become more efficient. Among other things, this will require more attention to what new information needs to be disseminated to whom, and to the special educational needs of that most important recipient, the individual practicing physician. In addition, motivation of the busy physician and means to fill his needs must somehow be built in, together with suitable mechanisms to evaluate the effectiveness of the entire process.

The situation may realistically be viewed as one of an expanding universe of medical science in interaction with another expanding universe of demands upon the practicing physician for services to patients, other health professionals, the community, the state, the nation and, perhaps before we even realize it, the world. But in this expanding situation the number of hours in any doctor's day remains absolutely constant. This inescapable fact sharply limits what any physician can do in a day or even a lifetime, and emphasizes that not a moment of the time he can devote to his continuing education should be wasted.

Since each physician possesses a different body of knowledge and experience, it would seem logical that his program of continuing education should be individualized if his time for this purpose is to be used most productively. It therefore follows that the somewhat diffuse concept of "continuing education" for all physicians will necessarily evolve into a more specialized, even personalized approach emphasizing "continuing *his* education" for each practicing physician. This could and should be truly stimulating for all concerned.

## Changing Concepts of Coronary Care

THE HIGH MORTALITY rate associated with acute myocardial infarction together with the development of reliable monitoring systems and effective resuscitative techniques stimulated the creation of coronary care units. The original concept of prompt resuscitation of patients in cardiac arrest proved to have limited therapeutic potential; most of the patients died. The recognition of premonitory signs of serious arrhythmia and the introduction of effective antiarrhythmic drugs and pace-

makers has produced in recent years a shift in emphasis to prevention of life-threatening dysrhythmias. Several studies clearly document the efficacy of this approach.<sup>1,2</sup>

However, mortality from acute myocardial infarction complicated by shock or severe heart failure remains distressingly high. Clearly, indices of myocardial function should be monitored in this group of patients. Many coronary units now are utilizing hemodynamic and biochemical measurements for assessing the degree of myocardial dysfunction as well as the response to various therapeutic programs. Such an approach, obviously, calls for an exceptionally skilled physician-nurse team.

The cornerstone of effective coronary care is this highly trained cadre of physicians and nurses. The nurses must be highly skilled in recognizing premonitory danger signals and should be empowered to initiate appropriate therapy. In this issue of CALIFORNIA MEDICINE, Stein and his associates report the need for trained personnel in established (or projected) units in California. Lack of the needed training may, in part, explain the observed under-utilization of nursing staff within some existing units. The need for properly trained personnel is an important community health priority and we applaud the efforts of the California Heart Association and the Regional Medical Programs\* in expanding physician-nurse training programs to meet this need.

\*Regional Medical Programs recently has approved three operational grants for the training of physicians and nurses working in Coronary Care Units. These grants have been awarded to Area 1 (University of California at San Francisco), Area 5 (University of Southern California), and Area 4 (University of California at Los Angeles).

### REFERENCES

1. Lown, B., Fakhro, A., Hood, W. B., and Thorn, G. W.: The coronary care unit: new perspectives and directions, JAMA 199:188, 1967.
2. Killip, T., and Kimball, J. T.: Treatment of myocardial infarction in a coronary care unit, Amer. J. Cardiol. 20:457, 1967.

## Doctrine In An Age of Science

A RECENT AND far reaching pronouncement of doctrine from across the sea invites thoughtful consideration of what is to be the place of doctrine from whatever source in a rapidly materializing age of science. Webster defines doctrine as "something that is taught: something that is held, put forth as true, and supported by a teacher, a school

or a sect.”\* It is something of an article of faith, to be accepted without question or challenge. Doctrine in this definition has long been and still is part and parcel of many scholarly disciplines and of much human behavior. And it must be admitted that there is still much in medicine that is more doctrinal than truly scientific. But it is the genius of present-day science that sooner or later whatever is doctrine or theory or simply belief will be questioned, put to crucial test, and if found wanting either modified to fit the known facts or else cast aside.

Modern science is based upon a recognition of inherent order in the universe, an order which includes life itself. Scientific progress occurs when knowledge of this order is increased or when the capability of man to manipulate the order is improved. Science as we think of it today is still very young. Many of its disciplines remain cluttered with unsubstantiated doctrine or belief, but its progress is inexorable and the pace of this progress is certainly quickening. Science with its questioning of long accepted theories and beliefs and its gradually increasing comprehension of the universal order, is *the* fundamental fact of the modern world. It is unquestionably destined, and perhaps quite soon, to become the ground substance of human thought and belief and thus a major determinant of human behavior. As this occurs an age of science on this earth will come into full being.

This is certainly no time to throw stones. It was not so long ago that medicine considered a normal pregnancy to be an illness and treated it as such. Only recently has the success of early ambulation after a major operation overcome the doctrine that a prolonged period of rest in bed was needed. The routine anticoagulation of the blood after a suspected myocardial infarction is still doctrine in debate.

It would seem that the lesson to be learned from all this is that we must get on with the business of understanding the inherent order in life and in the universe, and then get on with the business of helping human beings adapt themselves and their earthly environment to the realities of this inherent order. Medicine, with the help of others in many walks of life, can do much to bring this about. As this is done the age of science will come to its full stature, and any doctrine which is not of the ground substance of science will be remembered only for its historic interest.

## Guest Editorial

# Vectorcardiography

VECTORCARDIOGRAPHY, TRADITIONALLY limited by the paucity of trained interpreters and the scarcity of the cumbersome equipment as well as the confusing welter of techniques employed, has come of age. Most of the limitations mentioned have been overcome and the technique has much to offer the internist and the general practitioner in his own community hospital, although at present the service is available in less than five percent of hospitals having fewer than 500 beds.

The vectorcardiograph itself has been reduced in size and complexity over the past ten years. Very satisfactory machines are available which are as small and compact as an electrocardiographic machine and light enough to be transported easily to and from the hospital by the cardiologist. Of several methods of recording the cathode tube image, the Polaroid® film technique seems to us the most convenient because the film is instantly available. The Frank method of applying the electrodes has been widely adopted in recent years owing to its simplicity and the relatively slight distortion. Since 1964 we have used this convenience to make vectorcardiography available to two non-teaching, so-called community hospitals, one of 100 and the other of 200 beds. Our experience over these four years suggests that vectorcardiography does indeed have something to offer in the interpretation of cardiac status. In our experience the procedure finds its greatest usefulness in the following situations:

- Where myocardial infarction is suspected but the scalar electrocardiogram is equivocal.
- In localizing infarction of the myocardium where the scalar electrocardiogram is “silent.”
- In evaluating chamber hypertrophy.
- In evaluating conduction abnormalities.

The procedure is of distinctly less value than the scalar electrocardiogram in the determination of cardiac rhythm.

The following situations are offered as practical applications of the manner in which analysis of the vectorial display on the oscilloscope can help the cardiologist in resolving the common, day-to-day dilemmas which confront him in the interpretation of scalar electrocardiograms. These examples are intended to be illustrative only and are obviously not intended as complete diagnostic criteria.

\* (Webster's Third New International Dictionary—Unabridged.)